Eight new marine bivalves from Australia (Mollusca, Bivalvia)

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ABSTRACT

Eight new bivalve species are described from Australia: *Tucetona angusticosta, Tucetona scalarisculpta* and *Mactra (Mactra) westralis,* from Western Australia; *Spisula (Notospisula) austini* from the Northern Territory; and *Pitar (Pitarina) spoori, Pitar (Pitarina) nancyae, Pitar (Pitarina) trevori* and *Lioconcha annettae* from Queensland. *T. angusticosta* and *T. scalarisculpta* are placed in the Glycymerididae; *M. westralis* and *S. austini* in the Mactridae; and *P. spoori, P. nancyae, P.trevori* and *L. annettae* in the Veneridae.

INTRODUCTION

The bivalve fauna of Australia is rich and diverse. While much relevant literature exists from the early days of exploration to the present, information is fragmented and often relatively hard to find. For this reason a study of twenty-six families of Australian bivalves has been undertaken over the past twelve years. During the course of this study we have examined the collections in all the major museums in Australia and Europe and have encountered eight species which appear to be undescribed.

MATERIALS AND METHODS

All measurements were done by K. Lamprell and T. Whitehead using vernier calipers. Photographs were prepared by the photographic department of the Queensland Museum.

ABBREVIATIONS USED

AM = Australian Museum
QM = Queensland Museum
WAM = Western Australian Museum

MV = Museum of Victoria
BMNH = British Museum (Natural History)
lv = left valve
rv = right valve
pv = paired valves

SYSTEMATICS

The systematic arrangement at family, generic and subgeneric level follows that of the Treatise on Invertebrate Paleontology (Moore, 1969) except in the case of the Glycymerididae.

Family Glycymerididae Newton, 1922

Genus *Tucetona* Iredale, 1939

Type *Pectunculus flabellatus* Tenison Woods, 1878

The genus *Tucetona* Iredale, has been synonymised with *Glycymeris* Costa, 1778 by Newell (in Moore, 1969) but the classification used here follows Matsukuma (1979) who adopted *Glycymeris* for smooth or weakly ribbed species with fine radial riblets and hirsute periostracum, and *Tucetona* for species that are ribbed, with thin periostracum. The genus *Tucetilla* Iredale, 1939 (type: *Glycymeris capricornea* Hedley, 1906) has also been synonymised by Newell (op.cit.) but is used by Habe (1961) and Matsukuma (1984, 1986) as a subgenus of *Glycymeris,* for shells with a surface sculpture of distant beaded ribs, fine interstitial riblets and sparse hirsute periostracum, and is here used for such species.

Tucetona angusticosta n.sp.

(Plate 1a-d)

Description of Holotype

Elongate-ovate, equivalve, nearly equilateral, moderately inflated, umbones raised above dorsal margin, anterodorsal margin almost straight, anterior margin rounded, postero dorsal margin gently sloping, posterior margin widely rounded, ventral margin rounded. Sculpture similar on both valves with 28 strong rounded radial ribs, separated by interstices almost twice their width. Ribs finer antero and postero dorsally. Fine concentric grooves cross entire shell surface. Periostracum a thin film, microscopically lamellose towards margins, colouration fawn. Ligament compressed dorso ventrally. Hinge with 33 close-set teeth in a low arch, with 11 central teeth minute; hinge plate very narrow. Muscle adductor scars well defined, anterior adductor scar elongate ventrally, posterior adductor scar smaller, rounded. Ventral margin crenulate, coarsely denticulate internally, corresponding to interstices of ribs. Colouration white, umbones red-brown, remainder of shell ornamented irregularly with red-brown dots or streaks on ribs, internally white, with dark-brown ventrally and posteriorly.

Holotype

WAM N-2773, 1 pv dredged 69 m., Zeewyk Channel, Houtman Abrolhos Is, WA. J. Seabrook on FRV "Lancelin", Mar 1963.

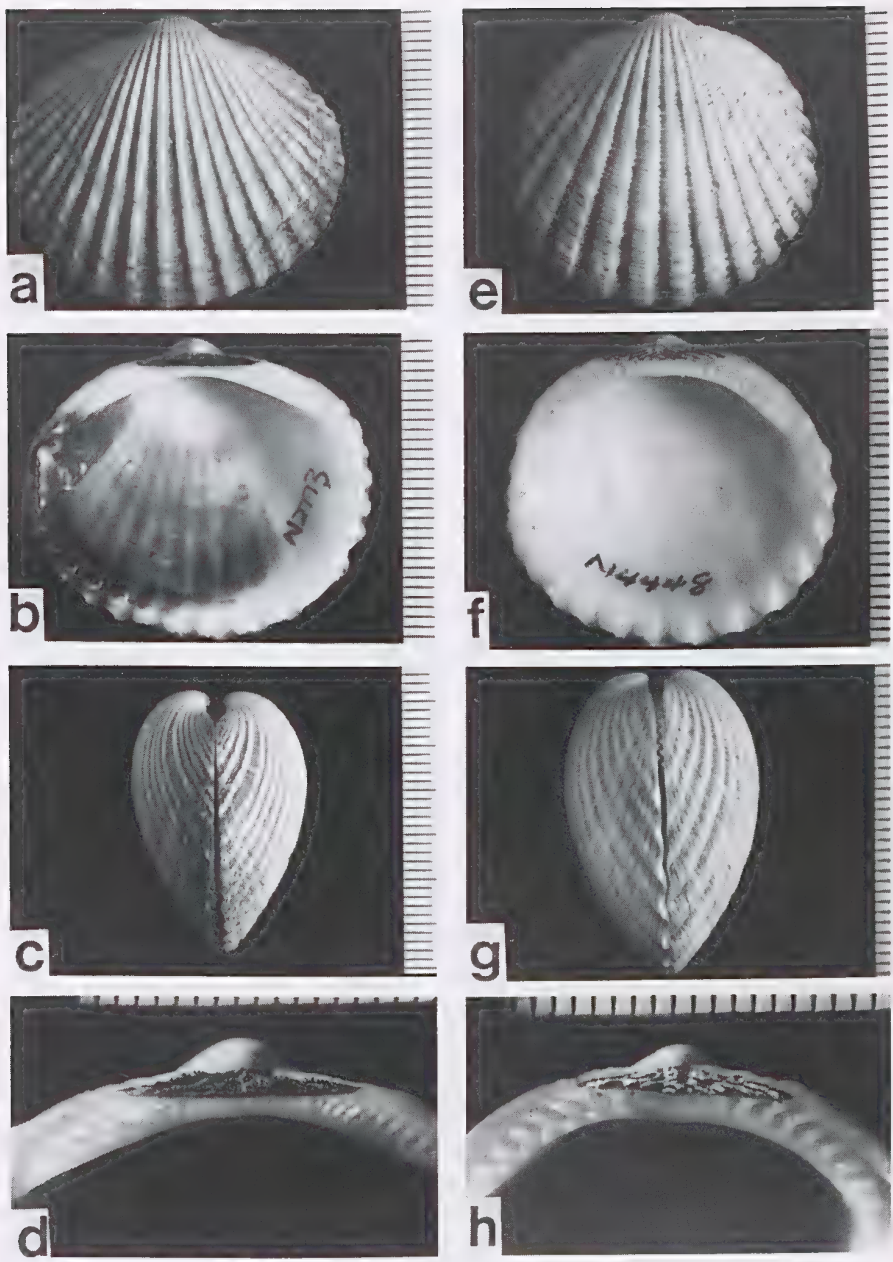

Plate 1. a-d. *Tucetona angusticosta* n. sp. Holotype; WAM N-2773, 38 m Zeewyk Channel, Abrolhos Islands, WA. J.Seabrook. a, right valve, exterior; b, left valve, interior; c, posterior view; d, right valve, hinge. (All scales in mm)

e-h. *Tucetona scalarisculpta* n sp. Holotype; WAM N-4448, NNW of Rottnest I, WA. 110 m, B. R. Wilson. e, right valve, exterior; f, right valve, interior; g, posterior view; h, right valve hinge. (All scales in mm)

Paratypes

WAM N-2773, 2 pv, same data as holotype.

Dimensions

	Length (mm)	Height (mm)	Width (mm)
Holotype	34	30	20
Paratypes	26	23	16
	19	17	11.5

Remarks

Tucetona angusticosta cannot be easily confused with any other Australian *Tucetona,* due to its much narrower ribs and elongate-ovate shape. *Tucetona angusticosta* differs from *T. flabellatus* (Tenison Woods, 1878) in having more numerous strongly raised ribs and being less inflated. *Tucetona scalarisculpta* n. sp. from Western Australia has fewer, broader ribs than *T. angusticosta,* in addition has strong scalariform sculpture absent in *T. angusticosta. Tucetona angusticosta* bears a superficial resemblance to species of *Glycymeris (Tucetilla),* particularly *Glycymeris (Tucetilla) crebreliratus* (Sowerby, 1889), from Queensland, but is differentiated by its larger size, smooth rather than nodulous ribs, which lack radial sculpture in the interstices, and in addition *T. angusticosta* lacks the hirsute periostracum seen in that species.

Distribution

At present known only from the type locality, Zeewyk Channel, Houtman Abrolhos Islands, Western Australia.

Etymology

Angusticosta = narrow ribs, from the Latin angustus = narrow, costa = rib.

***Tucetona scalarisculpta* n.sp.**

(Plate 1e-h)

Description of Holotype

Orbicular, equivalve, equilateral, moderately inflated, umbones raised above dorsal margin, antero-dorsal margin slightly convex, anterior margin rounded, postero-dorsal margin almost straight, gently sloping, posterior margin convex, ventral margin rounded. Sculpture similar on both valves, with 20 strong radial ribs, which are broader medially, interstices as wide as ribs; fine concentric sculpture appears as raised lamellae in the interstices, which correspond with deep grooves on the ribs, which cut rib surface into series of flattened contiguous plates. Periostracum consists of thin light brown film, present in interstices of ribs and thicker near margins, where it is lamellose. Ligament compressed dorso ventrally, elongate and encroaching on hinge. Hinge-plate narrow, raised in gentle arch. There are 8 strong teeth both anteriorly and posteriorly, closely following the line of the plate, separated by a narrow edentuluous area beneath the umbones. Muscle adductor scars well defined, both anterior and posterior small and of equal size and shape, delimited medially by a ridge. Margins coarsely crenulate, denticulate

internally corresponding with interstices of ribs. Colouration white internally and externally.

Holotype

WAM N-4448, 1 pv NNW of Rottnest I, WA dredged 118 m, sponge & sand. B. R. Wilson on FRV "Bluefin". Aug. 1962.

Paratypes

WAM N-4448, 1 pv, 1 lv, same data as holotype. WAM 3213-67, 1 rv 31°22'S, 115°05'E, W of Cape Leschenault, WA, 85-89m, CSIRO stn 217, 1963. WAM 3308-67 1 pv, 2 rv W of W end of Rottnest I, WA, 152 m, FRV "Bluefin", 1965. WAM 3214-67 1pv W of W end of Rottnest I, WA, 145 m FRV "Bluefin", 1965. WAM 3291-67 1pv W of Rottnest I, WA, 136 m CSIRO stn 144, 1963. WAM 8-90 1 lv E of Zeewyk Channel, Houtman Abrolhos Is, WA, 109-145 m, May 1960. WAM 4-90 1 rv W of Lancelin, WA, 112-121 m CSIRO stn 46, 1964. WAM 3329-67 1 lv N of Dirk Hartog I, Shark Bay, WA, 72 m, Hawaiian WA Exped., 1960. WAM 497-68 1 pv, 1 lv, 1 rv NW of Bluff Pt, WA, 127 m, CSIRO stn 131, 1963. WAM N-4412 3 rv, 1 lv WNW of Rottnest I, WA dredged 110-127m, sponge and sand, 1962.

Other material examined

WAM 3350-67 2 lv, 3 rv 16 km W of Bernier I, WA, in sand. 72 m, 24°52'S; 113°08'E, Hawaiian WA Exped., 1960. WAM 3301-67 2 rv, 1 lv., SW of Dongara, WA. 127 m, CSIRO stn 214, 1963.

Dimensions

	Length (mm)	Height (mm)	Width (mm)
Holotype WAM N-4448, 1 pv	34	30	20
Paratypes WAM N-4448, 1 pv	26	25	15
WAM N-4448, 1 lv	15.5	15	—
WAM 3291-67,1pv	13	12.9	7.7
WAM 8-90, 1 lv	31	30.4	—
WAM 4-90, 1 rv	31.9	30.8	—
WAM 497-68, 1 pv	14.5	13.9	12.6
WAM 497-68, 1 lv	12.9	12.2	—
WAM 497-68, 1 rv	10.4	10.3	—
WAM 4412, 3 rv	18.1	17.4	—
WAM 4412, 3 rv	19.5	17.9	—
WAM 4412, 3 rv	17.1	16.2	—
WAM 4412, 1 lv	16.4	16.1	—
WAM 3213-67, 1 rv	40	40.9	—
WAM 3308-67, 1 pv	18.4	17.5	11
WAM 3308-67, 2 rv	20.3	20.1	—
WAM 3308-67, 1 lv	18.5	18.2	—
WAM 3214-67, 1 pv	30.8	32.9	22.5

Remarks

Tucetona scalarisculpta is most similar in sculpture to juvenile specimens of *T. broadfooti* (Iredale, 1929) from South Australia, but otherwise differs in being orbicular rather than dorso ventrally elongate, and in having fewer ribs (20-21 rather than 25) with broader interstices. The hinge in *T. scalarisculpta* has 8-11 teeth on either side of the edentuluous area beneath the umbones, whereas in *T. broadfooti* there are 4 stout teeth anteriorly and 7 posteriorly. In addition all specimens of *T. scalarisculpta* are white, occasionally with faint, irregular brown spots on the ribs, in contrast to *T. broadfooti* which has red patterning antero and postero dorsally, with the rest of the shell pale brown, darker on the ribs. Adult *T. broadfooti* are not easily confused with *T. scalarisculpta* due to their larger size, and lack of sculpture in older specimens. *T. scalarisculpta* is somewhat similar to small specimens of *T. flabellatus* (Tenison Woods, 1878) which occurs from South Australia to New South Wales, but may be separated by its better defined and more raised ribs which are separated by interstices of equal width, the interstices in *T. flabellatus* being never more than half the width of the ribs. In addition, *T. scalarisculpta* is less inflated, lacks definite colour pattern and never grows to the size of adult *T. flabellatus*. The new species may be separated from small specimens of *T. gealei* (Angas, 1873) from south Queensland and New South Wales, by the absence of nodulous sculpture seen on the ribs of that species, which also differs in having interstices only half the width of the ribs. In addition *T. scalarisculpta* does not attain the size or colour pattern of adult *T. gealei*. *Tucetona scalarisculpta* may also be compared with *T. diomedea* (Dall, Bartsch & Rehder, 1938) and *T. mauia* (Dall, Bartsch & Rehder, 1938) from Hawaii. However both these species are of smaller size, have a greater number of ribs, and concentric sculpture of lamellose cords. *Tucetona scalarisculpta* is somewhat similar to the South Australian fossil species *T. convexus* (Tate, 1886) but differs in having fewer ribs, wider interstices and in lacking concentric lamellose sculpture on the ribs.

Distribution

From northwest of Cape Freycinet to west of Bernier I, Western Australia, in 72 to 146 m.

Etymology

scalarisculpta = ladderlike sculpture, from the Latin scala = ladder, sculpta = carve or engrave.

Family Mactridae Lamarck, 1809

Genus *Mactra* Linnaeus, 1767

Type species: *Cardium stultorum* Linnaeus, 1758

Subgenus Mactra Linnaeus, 1767

Mactra (Mactra) westralis n.sp.

(Plate 2a-d)

Description of Holotype

Shell trigonal, equivalve, equilateral, moderately compressed, umbones prosogyrate; antero dorsal margin convex, steeply sloping, anterior margin widely

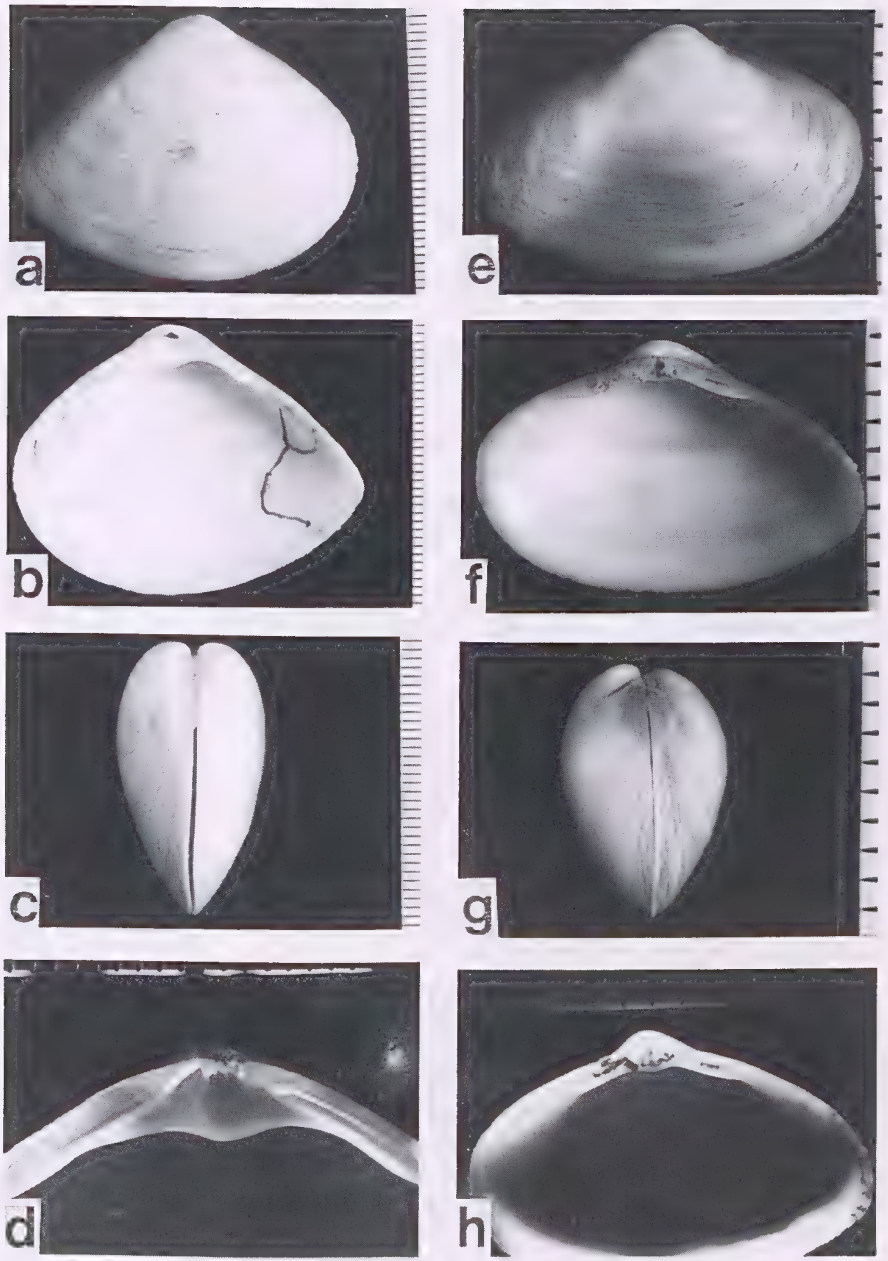

Plate 2. a-d. *Mactra (Mactra) westralis* n sp. Holotype; WAM 942-89, Cape Leveque, north WA, K. Lamprell. a, right valve, exterior; b, right valve, interior; c, anterior view; d, left valve, hinge. (All scales in mm)

e-h. *Spisula (Notospisula) austini* n sp. Holotype; MV F-57682, Gunn Point, Darwin, NT. J. Austin. e, right valve, exterior; f, right valve, interior; g, posterior view; h, right valve hinge. (All scales in mm)

rounded, postero dorsal margin almost straight, steeply sloping, posterior margin attenuate, ventral margin convex. Shell with moderate gape posteriorly, glossy, smooth. Lunule and escutcheon ill-defined, ligament large, triangular. Sculpture similar on both valves, consisting of microscopic concentric striae becoming obsolete towards the umbones. Hinge left valve, anterior lateral tooth, thin, long, posterior lateral long, thin; right valve, anterior laterals thin, long, anterior cardinal thin, oblique, posterior cardinal curved low in centre with ends elevated, posterior laterals long. Muscle adductor scars, anterior and posterior teardrop-shaped, well developed. Pallial sinus wide, shallow, rounded. Colouration white internally and externally, periostracum light straw coloured.

Holotype

WAM 942-89, 1 pv Cape Leveque, north WA, K. Lamprell, Aug. 1987.

Paratypes

MV F-4661, 2 pv Cable Beach, Broome, WA; WAM 943-89, 2 pv Karratha, WA, K.Lamprell, Sept 1987; QM M0 22854, 2 pv Cape Leveque, north WA, in front of lighthouse. K.Lamprell. Aug. 1987. AM C-157116, 2 pv Cape Leveque, north WA, in front of lighthouse. K. Lamprell. Aug. 1987.

Dimensions

		Length (mm)	Height (mm)	Width (mm)
Holotype WAM 942-89	1 pv	42	33	18
Paratypes MV F-4661	2 pv	32	25	13
		30	24	13
WAM 943-89	2 pv	38	29	17
		38	28	17
QM M0 22854	2 pv	37	29	11
		37	29	11
AM C-157116	2 pv	40	30	18
		38	28	12

Remarks

The genotype, *Mactra stultorum* (Linnaeus, 1758), from the Mediterranean, is a large inflated species with brown rayed pattern, to which *M. westralis* bears little resemblance except in basic generic characters. *Mactra (Mactra) westralis* is most similar to *M. (M.) explanata* Reeve, 1854 from north Western Australia, but differs from that species by its straight rather than concave posterior slope, less tumid shape medially and more elongate, angular posterior. In addition *M. explanata* has a much more robust shell than the new species. *M. westralis* is also similar to *M. abbreviata* Lamarck, 1809, which has a wide distribution in northern Australia, however, that species is much more inflated, with a broader and better defined lunule. The posterior muscle scar of *M. abbreviata* is large and round whereas in *M. westralis* it is smaller and teardrop-shaped. *M. westralis* is superficially similar to *M. (M.) pura* Deshayes, 1854, from South Australia, but differs in being much less inflated and in having a straighter posterior slope and less coarse lateral teeth. In addition *M. pura* has a solid, heavy shell while that of *M. westralis* is much lighter and thinner.

Distribution

North Western Australia from Shark Bay to Cape Leveque.

Etymology

Derived from its distribution, Western Australia, to which it appears to be restricted.

Genus *Spisula* Gray, 1857

Type species: *Mactra truncata* Montagu, 1808

Subgenus *Notospisula* Iredale, 1930

Type species: *Gnathodon parvum* Petit, 1853 [=*Mactra trigonella* Lamarck, 1818]

Spisula (Notospisula) austini n.sp.

(Plate 2e-h)

Description of Holotype

Shell elongate-ovate, equivalve, almost equilateral, moderately inflated, thin; umbones orthogyrate, raised above margins, with a keel to postero ventral margin; antero dorsal margin slightly convex, gently sloping, anterior margin widely rounded, postero dorsal margin convex, gently sloping, posterior margin ventrally truncate; ventral margin gently convex. Anterior of shell is considerably broader than posterior. Sculpture similar on both valves, consisting of microscopic concentric striae, covered with a pale brown, transparent periostracum. Ligament small, triangular in deep resilifer. Hinge of left valve with anterior lateral long, strongly ridged ventrally, cardinal thin, posterior lateral long, strongly ridged ventrally; right valve with paired anterior and posterior laterals, long, moderately wide, strongly ridged along their adjacent surfaces, cardinals thin, short. Muscle attachment scars well defined, anterior adductor scar teardrop-shaped, posterior adductor scar rounded. Pallial sinus short, rounded. Colouration white internally and externally.

Holotype

MV F-57682, 1 pv on beach after rough weather, Gunn Point, Darwin, NT. J. Austin. June 1983.

Paratypes

AM C-157114, 1 pv same data as holotype. QM M0-22853, same data as holotype.

Other material examined

Lamprell Collection, 1 pv same data as holotype.

Dimensions

		Length (mm)	Height (mm)	Width (mm)
Holotype MV F-57682	1 pv	14	9	6
Paratypes AM C-157114	1 pv	14	9	7
	1 rv	15	10	4
QM M0 22853	1 pv	16	10	8
Lamprell Collection	1 pv	14	10	6

Remarks

Spisula (Notospisula) austini which is distinguished from *Spisula* ss by the presence of ridged lateral teeth, cannot easily be confused with the only other Australian species of this subgenus, *S. (N.) trigonella* (Lamarck, 1818). This subgenus appears to be restricted to Australia. *Spisula trigonella* is much thicker, triangular, more inflated and grows to a much larger size than *S. austini. Spisula (Spisula) parva* (Petit, 1853), from Lord Howe Island, is an elongate form of *S. trigonella,* but still retains the characteristic trigonal shape of that species.

Distribution

At present known only from the type locality, Gunn Point, Darwin, Northern Territory.

Etymology

Named after Mr Jack Austin, who donated the specimens used in this study.

Family Veneridae Rafinesque, 1815

Genus *Pitar* Römer, 1857

Type species: *Venus tumens* Gmelin, 1791

Subgenus *Pitarina* Jukes-Browne, 1913

Type species: *Cytherea citrina* Lamarck, 1818

***Pitar (Pitarina) spoori* n.sp.**

(Plate 3a-d)

Description of Holotype

Shell trigonally ovate, equivalve, the anterior end of shell being less than one quarter of maximum length, moderately inflated, solid; umbones oblique, approximate, lunule large, heart-shaped, raised centrally, striate, surrounded by an impressed line; antero dorsal margin short, slightly convex, sharply sloping, narrowly rounded terminally; postero dorsal margin slightly convex, gently sloping, broadly truncate posteriorly; ventral margin widely convex. Shell appears smooth, microscopic sculpture similar on each valve, consisting of low concentric ridges and growth lines, smooth medially, with oblique striae anteriorly and posteriorly; periostracum thin, white, situated posteriorly and at the ventral margin. Ligament narrow, impressed. Hinge of left valve with anterior lateral tooth short and peg-like, anterior cardinal thin, acline, separated from median cardinal by inverted v-shaped socket; median cardinal solid, triangular, posterior cardinal free, thin, elongate and oblique, posterior lateral thin, parallel to nymph. Hinge of right valve with paired anterior lateral teeth, anterior cardinal short, narrow, median cardinal moderately wide, inverted v-shape, posterior cardinal oblique, long, bifid, posterior laterals paired, parallel to nymph. Muscle attachment scars well defined, anterior adductor scar teardrop-shaped, posterior adductor scar large, somewhat quadrate. Pallial line thick, ragged. Pallial sinus moderately shallow, wide, bluntly angulate terminally. Colouration white, with interrupted brown radial rays on the anterior two thirds of shell surface, a wide brown radial ray covers the posterior third of the shell, umbones and escutcheon white, escutcheon partly crossed by brown chevron pattern, internally white.

Plate 3. a-d. *Pitar (Pitarina) spoori* n sp. Holotype; AM C-133572, Bank Reef, north Qld. I. Loch. a, right valve, exterior; b, right valve, interior; c, anterior view; d, right valve hinge. (All scales in mm)

e-h. *Pitar (Pitarina) nancyae* n sp. Holotype; QM MO 22851, Boyne I, central Queensland. N. Trevor. e, right valve, exterior; f, right valve, interior; g, anterior view; h, right valve, hinge. (All scales in mm)

Holotype

AM C-133572, 1 pv 3-6 m, in gutters at top of drop off. NW tip of reef N of No. 5 Bank Reef, N Qld, 13°40′S; 144°09′E. I. Loch.

Paratypes

AM C-142104, Broadhurst Reef, E of Townsville, N Qld, subtidal, I. Loch 20th Jul 1975; QM M0 19860, 2 lv & 2 rv Orpheus I, N Qld, subtidal, Jul. 1985; AM C-155847, 1 lv & 2 rv Michaelmas Cay, off Cairns, N Qld, Gt Barrier Reef Boring Exp. T. Iredale & G. P. Whitley. May-Jun. 1926; AM C-148161, 1 lv & 2 rv Mystery Reef, Swain Reefs, Qld. 4-6 m around bommie in lagoon. I. Loch & K. Portch 12th Jan 1985; AM C-155850, 1 pv Wheeler Reef, N Qld, subtidal. I. Loch; AM C-155849, 2 rv Lizard I, N Qld, 6-17 m, in sandy rubble. W. F. Ponder, P. H. Colman & I. Loch 10th Dec 1974; AM C-155848, 1 lv Lizard I, N Qld, at base of reef, 9-12 m. W. F. Ponder 11th Dec 1974.

Other material examined

AM C-33566, 1 pv Philippines, Purch. from Sowerby & Fulton. Pres. C. Hedley; AM C-155846, 1 pv Mauritius; AM C-80100, 1 rv inlet at N end of Kranket I, Madang, N coast Papua New Guinea, W. F. Ponder & P. Colman 31st May 1970; AM C-155841, 1 pv Osprey Reef, W Coral Sea. 10-13 m coral and rubble on bommie, W side of lagoon. I. Loch & D. Young 15th Dec 1984; AM C-155845, 1 rv Pinamucan, Batangas Bay, Luzon I, Philippines. Coral reef, 2-4 m. C. Short 12th Dec 1975; BM NH Acc.no-2223, 1 pv Mombasa ; BM NH 902.12.30 1 pv Aden.

Dimensions

		Length (mm)	Height (mm)	Width (mm)
Holotype AM C-133572,	1 pv	31	25	17
Paratype AM C-142104,	1pv	29	23	16
QM M0-19860,	2 lv & 2 rv	35	28	— larger
AM C-155847,	1 lv & 2 rv	32	25	— larger
AM C-148161,	1 lv & 2 rv	35	29	— larger
AM C-155850,	1 pv	25	19	14
AM C-155849,	2 rv	24	18	— larger
AM C-155848,	1 lv	16	12	—
Other material examined				
AM C-33566 (part),	1 pv	28	21	16
Lamprell collection	1 pv	32	26	20
	1 rv	31	25	—
	1 lv	36	28	—

Remarks

Pitar (Pitarina) spoori bears little resemblence except in basic subgeneric characters, to *P. (P.) citrina,* type of the subgenus, which is much larger, more solid, and lacks the distinctive colouration of *P. spoori. Pitar spoori* is sympatric wih two other similar species of the subgenus *Pitarina* in Queensland. From *P. subpellucida*

(Sowerby, 1851) it differs in having the lunule better defined, the posterior broadly truncate rather than rounded and the pallial sinus is larger and more bluntly terminating. The oblique striae occurring anteriorly and posteriorly in *P. spoori* are lacking in *P. subpellucida.* The colour and distinctive pattern of *P. spoori* are remarkably constant in all the specimens examined, being quite different from the overall brown colouration of most *P. subpellucida.* In addition *P. spoori* is always white internally, while *P. subpellucida* is variably coloured with brown internally. *Pitar spoori* may be compared with *P. limatula* (Sowerby, 1851), but is more truncate posteriorly and lacks the dark brown colouration on the lunule and escutcheon that is characteristic of *P. limatula.* Internally the pallial sinus of *P. spoori* is much wider than in *P. limatula,* in addition the new species lacks the central yellow colour and black dorsal margins of that species. *Pitar spoori* is also superficially similar to *P. varians* (Hanley, 1844) from Brazil, and *P. hebraea* (Lamarck, 1818) from the Indian Ocean, but may easily be separated from these by its more elongate and truncate posterior.

Distribution

Tropical Indo-Pacific, from the Western Indian Ocean to the Western Pacific.

Etymology

Named after Mr Phillip Spoor of Townsville who first brought this species to our attention and donated specimens for study.

***Pitar (Pitarina) nancyae* n. sp.**

(Plate 3e-h)

Description of Holotype

Shell elongate-ovate, equivalve, inequilateral, the anterior being 1/3 of the shell length; moderately inflated, moderately solid; umbones prosogyrate, approximate, lunule impressed, raised centrally, striated, surrounded by an impressed line; anterodorsal margin short, concave, sloping, rounded at its termination and attenuate (more apparent in smaller specimens), posterior margin convex, broadly truncate at its termination, ventral margin evenly convex. Sculpture similar on both valves consisting of microscopic concentric lines and stronger concentric growth pauses, periostracum straw coloured, most obvious posteriorly. Ligament impressed, area narrow. Hinge of left valve with anterior lateral tooth peg-like; anterior cardinal thin, joined at its apex with a rather thick median cardinal tooth, separated by a deep pit; posterior cardinal strong, oblique, almost parallel to the escutcheon; posterior lateral long, parallel to the escutcheon. Hinge of right valve with anterior lateral teeth separated by a deep pit to take the peg-like tooth in the left valve; anterior cardinal thin, acline; median cardinal, thin, acline, separate; posterior cardinal moderately long, almost parallel to the escutcheon, bifid; posterior lateral, long, parallel to the escutcheon. Muscle adductor scars poorly defined, anterior adductor scar teardrop-shaped, posterior larger, rounded. Pallial line doubled. Pallial sinus moderately deep, ascending, rounded terminally. Colouration glossy white externally, with wide broken rays of tan, lunule and escutcheon coloured similarly, but markings not reaching valve margins; umbones purple tipped anteriorly, internally glossy white, with a small pale purple spot beneath.

Holotype

QM M0 22851, 1 pv on sand among shell debris after strong winds, Boyne I, Qld, on beach near mouth of river, at low tide. N. Trevor Feb 1988.

Paratypes

AM C-160472, 1 preserved specimen, same data as holotype; AM C-160473, 1 pv drgd. in 9 m, sand and rubble between Palm I and Cuacoa I, N Qld. K. Lamprell & P. Spoor; WAM 940-89, 1 pv drgd. in 9 m, sand and rubble between Palm I and Cuacoa I, N Qld. K. Lamprell & P. Spoor; MV F-57680, 1 pv on sand among shell debris after strong winds, Boyne I, Qld, on beach near mouth of river, at low tide. N. Trevor Jan 1988.

Other material examined

Lamprell Collection: 1 pv on sand and mud among shell debris, Turkey beach, central Qld at low tide. B. Heidke 1987; 1 pv on sand among shell debris after strong winds, Boyne I, Qld, on beach near mouth of river, at low tide. N. Trevor Feb 1988; 1 pv on sand among shell debris, Malaita, Solomon Is., A. & B. Boorman; 1 pv on sand among shell debris, at low tide, Dingo Beach, N Qld. J. Lamprell Jul 1987; 1 pv on sand among shell, Keppel Bay, central Qld. obtained from Mrs E.Coucom.

Dimensions

	Length (mm)	Height (mm)	Width (mm)
Holotype QM M0 22851, 1 pv	34	28	19
Paratypes			
AM C-160472, 1 pv preserved	27	22	17
AM C-160473, 1 pv	21	17	12
WAM 940-89, 1 pv	22	18	13
MV F-57680, 1 pv	27	22	12
Lamprell Collection 17 pv	14-35	12-29	9-22

Remarks

Pitar (Pitarina) nancyae bears little resemblence except in basic subgeneric characters, to *P. (P.) citrina,* type of the subgenus, which is much larger, more solid, and lacks the distinctive colouration of *P. nancyae. Pitar nancyae* is most likely to be confused with juvenile examples of *P.(P.) affinis* (Gmelin, 1791) which also occurs in Queensland, but differs in being more elongate and attenuate posteriorly, in having an impressed line around the lunule. In addition the pallial sinus in *P. nancyae* is ascending, whereas the pallial sinus in *P. affinis* of the same size lies horizontally and is wider terminally, while the pit separating the anterior and median cardinal teeth is much narrower in *P. nancyae,* corresponding with the width of the corresponding cardinal tooth on the opposite valve. Adults of *P. affinis* and *P. nancyae* are readily separated, the latter attaining a maximum length of 36 mm, while *P. affinis* grows to 75 mm in length and has a heavier shell. *P. nancyae* is somewhat similar to *P. hebraea* (Lamarck, 1818) from the Indian Ocean, but is less attenuate and broadly convex posteriorly, rather than narrowly

truncate. In *P. hebraea* the pallial sinus is wide, rounded and not ascending as in *P. nancyae*. *P. nancyae* is also superficially similar to *P. varians* (Hanley, 1844), from Brazil, however the postero dorsal margin of *P. varians* is longer and slopes more steeply than that of *P. nancyae*. In addition *P. nancyae* is more inflated than *P. varians*, has the pallial sinus ascending rather than parallel to the pallial line, and the median and anterior cardinal teeth less widely spaced and joined at their apex. Compared with *P. sophiae* (Angas, 1877), which occurs in south Queensland, *P. nancyae* attains a much larger size, is far more inflated and does not have the characteristic red spotting beneath the umbones seen in *P. sophiae*.

Distribution

Central to north Queensland and the Solomon Islands. It is probable that this species will eventually be found to have a wider distribution in the Western Pacific.

Etymology

Named after the late Mrs Nancy Plumb of Yeppoon, Queensland, who has done much to further the study of Australian bivalve molluscs.

Pitar (Pitarina) trevori n. sp.

(Plate 4a-d)

Description of Holotype

Shell ovate, equivalve, inequilateral, the anterior end of shell being 1/3 of the shell length; moderately inflated, thin, glossy; umbones approximate, lunule heart-shaped, striated, surrounded by an impressed line; antero dorsal margin moderately convex, sharply sloping, somewhat rounded terminally; postero dorsal margin almost straight, gently sloping, posterior margin widely rounded; ventral margin convex. Sculpture similar on each valve, consisting of very fine, concentric lines and growth pauses; periostracum grey, with sand adhering to most of shell surface particularly posteriorly. Ligament narrow, impressed. Hinge of left valve with anterior lateral tooth long, peg-like, moderately thick; anterior cardinal, thin, slightly oblique; median cardinal solid, broad, raised posteriorly, separated by a wide pit from the posterior cardinal which is thin and oblique; posterior lateral long, thin, parallel to the nymph. Hinge of right valve with paired anterior laterals, separated by a deep pit; anterior cardinal thin, acline; median cardinal thin, acline, separated by a wide pit from the posterior cardinal which is oblique and bifid; posterior lateral long, solid, parallel to the nymph. Muscle adductor scars well defined, anterior adductor scar long, narrow, posterior adductor scar large, teardrop-shaped. Pallial line doubled, ragged. Pallial sinus short, wide, ascending, rounded terminally. Colouration off-white externally, sometimes with faint brown radial rays posteriorly, internally white often with yellow marginally and at the posterior adductor scar.

Holotype

QM M0 22850, 1 pv on sand flats at low tide, Dingo Beach, N Qld. Coll. on low tide, J. Lamprell Jul 1987.

Paratypes

MV F-57679, 1 pv same data as holotype. AM C-160471, 1 pv same data as holotype. WAM 939-89, 1 pv on sand flats at low tide, Gove, NT. K. Lamprell Aug 1987.

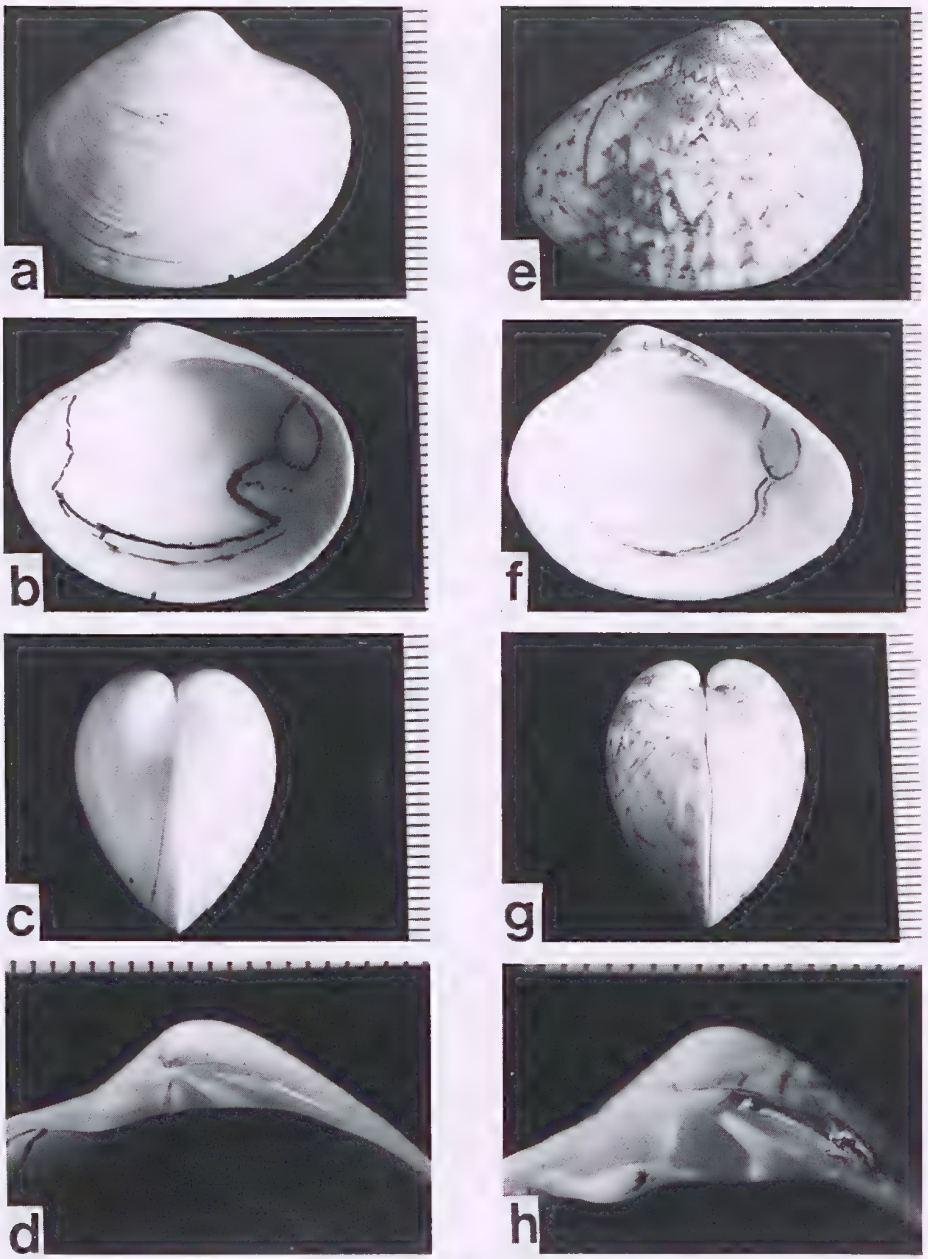

Plate 4. a-d. *Pitar (Pitarina) trevori* n sp. Holotype; QM MO 22850, Dingo Beach, north Qld. J. Lamprell. a, right valve, exterior; b, right valve, interior; c, anterior view; d,right valve, hinge. (All scales in mm)

e-h. *Lioconcha (Lioconcha) annettae* n sp. Holotype; QM MO 22852, Swains Reef, central Qld. D. & V. Harris. e, right valve, exterior; f, right valve, interior; g, anterior view; h, right valve, hinge. (All scales in mm)

Other material examined

Lamprell Collection: 2 pv Turtle I, Fiji. On sand flats at low tide. K. & J. Lamprell, 1979; 6 pv Kurramine Beach, N. Qld. K. Lamprell. 1982.

Dimensions

		Length (mm)	Height (mm)	Width (mm)
Holotype QM M0 22850,	1 pv	30	28	19
Paratypes MV F-57679,	1 pv	32	27	19
AM C-160471,	1 pv	31	27	19
WAM 939-89,	1 pv	27	23	15
Lamprell Collection	44 pv	15-36	12-31	9-22

Remarks

Pitar (Pitarina) trevori may be separated from the sympatric and superficially similar *P.(P.)pellucida* (Lamarck, 1818), by the lunule being defined by an incised line which is absent in the latter species. *Pitar pellucida* is a more elongate-ovate and compressed species, while *P. trevori* is more inflated and trigonal. In addition, *P. trevori* lacks the characteristic light brown reticulate pattern, brown umbones and purple spot beneath them usually seen in *P. pellucida.* Compared with the sympatric *P. (P.) limatula* (Sowerby, 1851), *P. trevori* is more triangularly elongate, has thinner and more widely spaced anterior and median cardinal teeth, and lacks the rich cream external colour, dark brown lunule and escutcheon, and internal deep orange colouration characteristic of *P. limatula.*

Distribution

Central Queensland to Northern Territory and Fiji. It is likely that this species has a wider distribution in the South West Pacific than indicated by the available material.

Etymology

Named after Mr Noel Trevor of Boyne I, Queensland, who has collected widely in all Australian States and has been very helpful in providing us with material for study.

Genus *Lioconcha* Mörch, 1853

Type species *Venus castrensis* Linnaeus, 1758

Subgenus *Lioconcha* Mörch, 1853

***Lioconcha (Lioconcha) annettae* n. sp.**

(Plate 4e-h)

Description of Holotype

Shell trigonal, attenuate posteriorly, equivalve, inequilateral the anterior end being 1/4 of the shell surface, moderately inflated, solid. Umbones moderately separated, lunule lanceolate, impressed, striate, ill-defined, surrounded by a faint incised line. Antero dorsal margin convex, short, steeply sloping, rounded terminally; postero dorsal margin long, slightly convex, steeply sloping, narrowly rounded and attenuate terminally; ventral margin convex, rising sharply anteriorly. Sculpture similar on each valve, consisting of fine, dense, concentric ridges, umbones smooth, periostracum straw coloured. Ligament thin, impressed. Hinge of left valve with the anterior lateral tooth thick, peg-like; anterior cardinal moderately thin, joined at its apex with a thick, elongate, triangular median tooth,

separated by a deep pit; posterior cardinal separated from the median tooth by a moderately wide pit; posterior lateral moderately long, thin, slightly convex and parallel to the nymph. Hinge of right valve with the anterior lateral teeth thick and separated by a deep pit; anterior cardinal solid, peg-like, separated by a narrow pit from the median tooth which is triangular and moderately thick, separate, posterior cardinal oblique, thick; posterior lateral long, low and parallel to the nymph. Muscle adductor scars well defined, anterior adductor scar is elongate-ovate, the posterior adductor scar teardrop-shaped, of almost equal size. Pallial line wide, set well inside the ventral margin. Pallial sinus very shallow. Colouration white, with chestnut-red and dark brown hieroglyphic patterns, internally white, canary yellow centrally; lunule white, with purple spots beneath umbones.

Holotype

QM M0 22852, 1 pv dredged Swain Reefs, central Qld, in coral sand. D. & V. Harris. 1986.

Paratypes

AM C-160474, 1 pv dredged 3-7 m, Lady Musgrave Lagoon, central Qld, in coral sand, D. & V. Harris, 1986; WAM 941-89 1 pv dredged 3-7 m, Lady Musgrave Lagoon, central Qld, in coral sand, D. & V. Harris, 1986; MV F-57681, 1 pv dredged 3-7 m, Kelso Reef, N Qld, in coral sand, K. Lamprell and P. Spoor, Aug 1985.

Other material examined

Lamprell Collection: 2 pv Taylor Reef, N Qld, K. Lamprell, 1985; 1 pv North West I, in coral sand in gutter, 0.3 m, K. Lamprell, 1981.

Dimensions

		Length (mm)	Height (mm)	Width (mm)
Holotype QM M0 22852,	1 pv	39	31	23
Paratypes AM C-160474,	1 pv	35	31	21
WAM 941-89,	1 pv	27	22	16
MV F-57681,	1 pv	24	20	15

Remarks

Lioconcha annettae has long been misidentified as *L. tigrina* (Lamarck, 1819), probably because Sowerby (1851) figured a species similar to *L. annettae* from the Philippines as *L. tigrina*. *Lioconcha tigrina* is a distinct Indian Ocean species. The type (fig.1) Museum d'Histoire Naturelle, Geneva, Lamarck collection 1084/35, No. 34, differs from *annettae* in being ovate, less attenuate, more widely rounded posteriorly, and much more coarsely ridged concentrically. The colour pattern of *L. tigrina* is consistently of small adjacent red-brown triangles in close concentric rows, often producing a striped pattern, not finely and irregularly reticulate as in *L. annettae*. A specimen from the Western Indian Ocean, which agrees with Lamarck's type, is in the Queensland Museum, (QM M0 9893). Four specimens similar to those figured by Sowerby appear in lot (QM M0 14448). These are from the Philippines and are different from *L. tigrina* and *L. annettae*, but of uncertain identity. They are somewhat similar in shape to *L. annettae* but are distinguished by being more attenuate posteriorly, with straight postero-dorsal margin and lack purple spots beneath the umbones. In colouration, the Philippine species is distinguished from *L. annettae* by its irregular, bold pattern of dark brown or black

triangles, dark brown lunule and dark brown colouration internally towards the ventral margin. *L. (L.) annettae* is distinguished from *L. (L.) fastigiata* (Sowerby, 1851), which occurs coastally in central and north Queensland, but only rarely on the Great Barrier Reef, by its much more attenuate and compressed posterior end, larger size, up to 40 mm max. length, in having a longer median cardinal tooth and an anterior lateral tooth which has a narrower pit than in *L. fastigiata.* In addition *L. annettae* is more coarsely sculptured than *L. fastigiata.* The reticulate colour pattern which is constant in both species, is rather nebulous, and irregularly netted in *L. annettae,* but bold and regular in *L. fastigiata, L. annettae* also lacks the black colouration of the lunule always present in *L. fastigiata.*

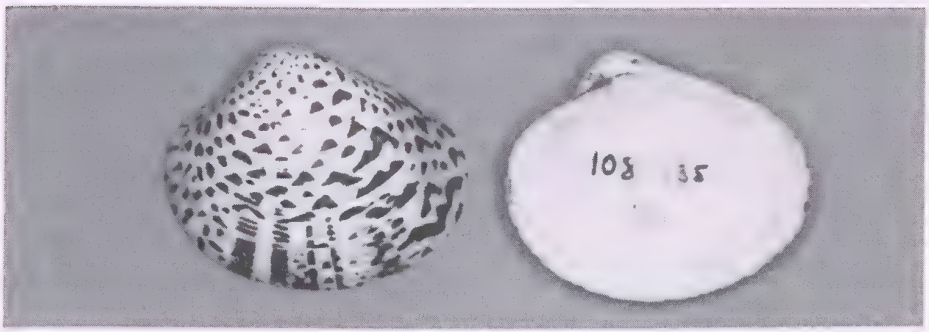

Figure 9. Holotype of *Lioconcha tigrina* (Lamarck, 1819)

Distribution

Queensland, Great Barrier Reef.

Etymology

Named after Mrs Annette Whitney, who has provided much useful material and information for our study of Australian bivalves.

ACKNOWLEDGMENTS

We are grateful to Dr Winston Ponder and Ian Loch, Australian Museum, Sydney; Ms Sue Boyd, National Museum of Victoria; Dr Fred Wells and Ms Shirley Slack-Smith, Western Australian Museum; Ms Solene Morris, British Museum (Natural History); Dr Yves Finet, Museum of Natural History, Geneva, who kindly provided study facilities and freely gave much needed advice and assistance. We are very grateful to the many Australian collectors who have donated material or who have allowed us to examine their collections during the course of this study. Our particular thanks to Dr John Stanisic, Queensland Museum for his continuing helpful advice and for critically reading the manuscript and to Darryl Potter of the Queensland Museum. Overseas travel was funded in part by a grant from the CSIRO, Science and Industry Endowment Fund. Photographic expenses were partially met by funds received from the Keith Sutherland Award.

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